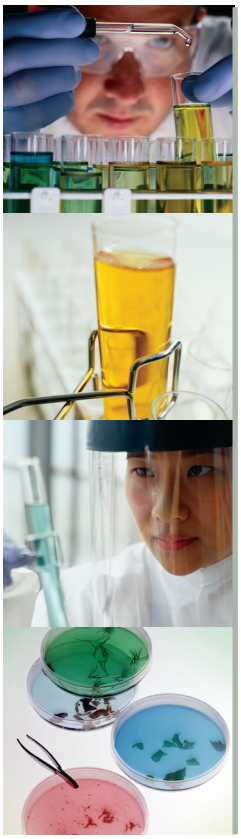
BioPharma Briefs



Sensitizers, Part 1: Skin

So what's a sensitizer, anyway?

The prevention of toxic effects from chemical hazards is often based on a simple strategy: "The dose makes the poison." This means any effect of the toxin can be prevented if the dose is kept low enough. Sensitizers undermine this doctrine because a person who becomes sensitized to a material reacts on re-exposure at much lower levels than may produce any other effect like irritation.

A sensitizer is a substance that has been shown to elicit an allergic response after an initial exposure, resulting in the development of symptoms upon subsequent exposure at much lower concentrations. Sensitizers can cause skin and/or respiratory responses in an affected worker. The reaction does not occur on the first exposure. However, repeated exposure can stimulate the immune system, which becomes "primed" to react to subsequent, but much smaller amounts. The risk of becoming sensitized is a complex interaction of the workers' immune system (host factors), the amount and frequency of exposure (the dose), and the intrinsic hazards of the material (sensitizing potential).

Skin sensitizers can cause allergic contact dermatitis, a rash with redness, itching bumps and blisters occurring at the point of contact. (See *BioPharma Briefs,* December 2008.) Poison ivy is the most common skin sensitizer found in the environment. Numerous skin sensitizers can be found in the workplace, such as formaldehyde, methyl methacrylate and other epoxies, and toluene diisocyanate.

How can one identify if a material has sensitizing potential? This property may be identified on the Material Safety Data Sheet (MSDS). But often this is not reported or may be obscured by generic phrases like "may cause rash" which applies to irritant (non-sensitizing) materials. Safety Data Sheets from Europe will contain an S-notation, indicating that this material has been shown to be a sensitizer, and some will specify if there are dermal or respiratory effects.

Two other methods can be used to determine the sensitizing potential of a material. One is to perform a medical literature search to see what studies are reported. Few controlled trials are available except for the materials that affect larger populations, such as latex, so case reports or small case series may be available. Laboratory tests on animals can provide some guidance. The older guinea pig maximization test (GPMT) measured the delayed reaction to applications of test material to the skin. The newer standard local lymph node assay (LLNA) measures reaction of lymph nodes to injections of test material and is a better indicator of dermal sensitizing potential. At present there are no standard tests for respiratory sensitizing potential, but the LLNA is often positive for both dermal and respiratory sensitizers. Also, the LLNA can be graded and helps assign a designation of strong versus weak sensitizer. Overall, these animal test systems have an 88% accuracy in predicting human sensitization.

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Tips on managing skin sensitizers:

1. Identify a material as a skin sensitizer before incorporating it into a process. Review the safety or medical literature before a large investment is made in using a sensitizer.
2. Contain the process where the skin sensitizer is handled. Spread of powders or liquids though dumping and other uncontrolled transfers will heighten the risk of exposures to workers. The risk of sensitization increases with the dose (volume and frequency) of exposure.
3. If not contained then add local ventilation.
4. If rashes are reported, have the worker evaluated by an occupational health provider soon, especially while the rash is still visible.
5. Is testing of the worker possible? Practically speaking, no: there are very few validated, FDA-approved skin tests available (one commercial products tests for 23 allergens). So the diagnosis is made primarily by clinical impression.
6. Prevention is the key to management.

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